REMARKS

Claims 2-4, 11-14, 21-24 and 30 have been canceled, and Claims 1, 5-10, 15-17, 19, 20, 25-27, 29 and 31-33 have been amended to place the above-referenced application in condition for allowance. In view of these amendments and the following reasoning for allowance, the applicants hereby respectfully request further examination and reconsideration of the subject application.

Affirmation of Election

The applicants hereby affirm the election without traverse to prosecute the invention of I, claims 1-34.

The Objection to the Specification

The abstract of the disclosure was objected to as the word "persons" in line 11 should be "person's". The foregoing amendment to the abstract makes this correction. Accordingly, the applicants respectfully request that the proposed amendment be entered and the objection to the abstract be withdrawn.

The Objections to Claims 5, 6, 16, 26, and 31-33

Claims 5, 6, 16, 26, and 31-33 were objected to for various reasons. As to Claim 5, none of the objections seem to apply so it is assumed this claim was identified in error. As to Claim 6, the misspelled word "Claims" was corrected and "PCA" was replaced with "principal components analysis (PCA)" as required. The PCA issue was also corrected in Claims 16 and 26. And finally, in Claims 31-33, all instances of "DVC" were changed to "DCV". It is believed these amendments have corrected the anomalies pointed out in the Office Action.

Accordingly, it is respectfully requested that the objection to these claims be withdrawn.

The Section 112, Second Paragraph, Rejections of Claims 9 and 32

Claims 9 and 32 were rejected under 35 USC 112, second paragraph, as being indefinite. It is believed that the foregoing amendments to the claims have clarified any indefiniteness that existed in the original claim language.

Specifically, Claims 9 and 32 were rejected as being indefinite because the phases "the neural network ensemble" and "the fusing neural network", in each claim respectively had insufficient antecedent basis. In response, the applicants have made these claims ultimately dependent from Claim 1 which introduces both of these elements, thus creating the proper antecedent basis for the aforementioned phrases.

It is believed the amended claims now fulfill the requirements of 35 USC 112, second paragraph, as they particularly point out and distinctly claim the subject matter that the applicants regard as the invention. Therefore, it is respectfully requested that the rejection of Claims 9 and 32 be reconsidered.

In addition, it is noted that Claims 7-9, 17, 19, 22 and 29 were amended to conform them to the changes made in their base and intermediate claims.

The Section 103(a) Rejection of Claims 1-6, 9-16, 19-26 and 29

Claims 1-6, 9-16, 19-26 and 29 were rejected under 35 USC 103(a) as being unpatentable over Turk, et al., U.S. Patent No. 5,164,992 (hereinafter Turk) in view of Niyogi et al., U.S. Patent No. 6,144,755 (hereinafter Niyogi). It is contended in the Office Action that Turk teaches all the elements of the rejected claims with the exception of creating a database that includes a person's face pose. However, it is

further contended that the Niyogi reference does teach this feature. Thus, it was concluded that it would have been obvious to incorporate the Niyogi teachings into Turk to produce the applicants' claimed invention. In response, the applicants have amended the rejected claims to make them non-obvious over the Turk-Niyogi combination.

More particularly, the independent claims in the rejected group (i.e., Claims 1, 10 and 20) were each amended to include the subject matter that was once presented in Claim 30. It was stated on Page 10 of the Office Action that Turk and Niyogi do not teach a network ensemble comprising a first stage having a plurality of classifiers and a neural network as its second stage. This is essentially the subject matter that was added to each of the aforementioned independent claims.

In order to deem the applicant's claimed invention unpatentable under 35 USC 103, a prima facie showing of obviousness must be made. To make a prima facie showing of obviousness, all of the claimed elements of an applicant's invention must be considered, especially when they are missing from the prior art. If a claimed element is not taught in the prior art and has advantages not appreciated by the prior art, then no prima facie case of obviousness exists. The Federal Circuit court has stated that it was error not to distinguish claims over a combination of prior art references where a material limitation in the claimed system and its purpose was not taught therein (*In Re Fine*, 837 F.2d 107, 5 USPQ2d 1596 (Fed. Cir. 1988)).

In this case, as admitted in the Office Action, neither Turk nor Niyogi teach the applicant's claimed neural network ensemble which includes a first stage having a plurality of classifiers dedicated to a particular pose range and a fusing neural network as its second stage which combines the outputs of the classifiers to generate an output indicative of the person associated with the characterized input image region. Thus, the applicant has claimed an element not taught in the cited combination, and which have advantages not recognized therein—namely the speed, accuracy, and ease of training afforded by a neural network

ensemble. Accordingly, no prima facie case of obviousness can be established in accordance with the holding of *In Re Fine*. This lack of prima facie showing of obviousness means that the rejected claims are patentable under 35 USC 103 over Turk in view of Niyogi. As such, it is respectfully requested that the rejection of remaining Claims 1, 5, 6, 9, 10, 15, 16, 19-20, 25, 26 and 29 be reconsidered based on the non-obvious claim language,

"training a neural network ensemble to identify a person and their face pose from a region which has been extracted from said input image and characterized in a manner similar to the plurality of model images, wherein the network ensemble comprises, a first stage having a plurality of classifiers each of which has input and output units and is dedicated to a particular pose range and outputs a measure of the similarity indicative of the similarity between said characterized input image region and each of said model image characterizations associated with the particular pose range of the classifier, and a fusing neural network as its second stage which combines the outputs of the classifiers to generate an output indicative of the person associated with the characterized input image region; and employing the network ensemble to identify the person associated with the characterized input image region".

The Section 103(a) Rejection of Claims 30 and 31

Claims 30 and 31 were rejected under 35 USC 103(a) as being unpatentable over Turk in view of Niyogi, and in further view of Kung et al., U.S. Patent No. 5,850,470 (hereinafter Kung). It is contended in the Office Action that the Turk-Niyogi combination teaches all the elements of the rejected claims with the exception of a network ensemble comprising a first stage having a plurality of classifiers and a neural network as its second stage. However, it is further contended that the Kung reference teaches this feature. Thus, it was concluded that it would have been obvious to incorporate the Kung teachings into Turk-Niyogi

combination to produce the applicants' claimed invention. The applicants respectfully disagree with the contention of obviousness.

Although Claim 30 has been cancelled and Claim 31 has been made dependent from Claim 1, the subject matter which the Examiner alleges is obvious has been incorporated into Claim 1 and all the other independent claims. It is the applicants' position that this subject matter is not taught in Kung, and therefore the remaining rejected claims of the application (including Claim 31) are not obvious over the cited combination.

A key difference in the applicants' claimed neural network ensemble and that taught in the Kung reference is that the applicants claim a fusion neural network as its second stage, whereas the Kung reference teaches a Maxnet as its second stage (see Figs. 2a and 2b of Kung).

The applicant's fusion neural network combines the outputs of the classifiers to identify the person associated with the input image region, and optionally that person's face pose as well. In this way data from all the classifiers is considered in making the decision. However, a Maxnet is a conventional neural network that is essential a "Winner-Takes-All" system which generates a binary output which indicates the winning classifier. That is, the classifier with the largest output. There is no combining of the classifier outputs or consideration of the combined data in Maxnet. Thus, the Maxnet is nothing like the fusion neural network claimed by the applicants.

Further, the claimed fusion neural network has distinct advantages in that is considers all the classifier inputs in making a decision as to the identity of the person in the input image region. This can prevent errors when two or more of the classifier outputs are very close to each other. The Maxnet does not enjoy this added error prevention capability.

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Accordingly, the applicants have claimed a feature not taught in the cited combination of references, and which have advantages not recognized therein. Accordingly, no prima facie case of obviousness has been established in accordance with the holding of *In Re Fine*. This lack of prima facie showing of obviousness means that the rejected claims are patentable under 35 USC 103 over Turk in view of Niyogi, and in further view of Kung. As such, it is respectfully requested that the rejection of remaining Claim 31 (as well as Claims 1, 5, 6, 9, 10, 15, 16, 19-20, 25, 26 and 29 which now include the neural network ensemble with a fusion neural network as it second stage) be reconsidered based on the non-obvious claim language,

"training a neural network ensemble to identify a person and their face pose from a region which has been extracted from said input image and characterized in a manner similar to the plurality of model images, wherein the network ensemble comprises, a first stage having a plurality of classifiers each of which has input and output units and is dedicated to a particular pose range and outputs a measure of the similarity indicative of the similarity between said characterized input image region and each of said model image characterizations associated with the particular pose range of the classifier, and **a fusing neural network as its second stage which combines the outputs of the classifiers** to generate an output indicative of the person associated with the characterized input image region; and employing the network ensemble to identify the person associated with the characterized input image region". (*emphasis added*)

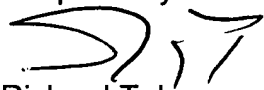## The Objections to Claims 7, 8, 17, 18, 27, 28 and 32-34

Claims 7, 8, 17, 18, 27, 28 and 32-34 were objected to as being dependent upon a rejected base claim. The Examiner stated that they would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The applicants at this time, however,

respectfully decline to rewrite these claims because it is their position that the independent claims from which these claims depend are patentable.

<u>Summary</u>

In summary, it is believed that the remaining claims are also now in condition for allowance. Accordingly, reconsideration of the rejection of remaining Claims 1, 5, 6, 9, 10, 15, 16, 19-20, 25, 26, 29 and 31 and withdrawal of the objections to Claims 7, 8, 17, 18, 27, 28 and 32-34, are respectfully requested. In addition, allowance of all the remaining claims at an early date is courteously solicited.

Respectfully submitted,

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